## **CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES**

#### NONCONFORMANCE REPORT

Project No. 20-5708-159 NCR No. 97-03 PART 1: DESCRIPTION OF NONCONFORMANCE Software 3DStress, version 1.2 and EBSPAC version 1.0 were released without having the required Design Verification Reports prepared. The software files did not include evidence of any form indicating that any of the required design verification activities had been performed. Responsible Manager: B. Mabrito Initiated by: R. Brient Chuil Date: 4/1/97 PART 2: PROPOSED DISPOSITION AND CORRECTIVE ACTION (Response by 4/10/97) Disposition: Formal Design Verification lagouts will be drawn up by The CALURA Code Custodions and The appropriate PI/Code Developers. Hote That EESAL Version 1.0 has not been released yet only ESSAL Version 1.06 Only ESSAL SETA VERSION has been sur Power DEN 4/18/97 Basis of Disposition: All, or almost all, walk in accordance with TOP.018 on These Two codes has been completed but The objective evidence of a formal DESIGN Ver front Report and Not fairshad. Formal Action to correct nonconformance: Design User Frintion Report did not Exist before 4/4/97. Complete The Design Verification Report. This concertir action uns coordinated with Elles L. Mckagus and R. BACA. Target date for completion: 5/16/97 Proposed by: 6. MABRITO Date: 4/10/97 PART 3: APPROVA Xalleng McKercenc Date: 4/10/97 Element Manager; \_Date: \_<u>4/10/97</u> Director of OA: Comments/Instructions: B. Mabrito PART 4: CLOSE OUT Comments: Design Verifications legants for 3DSTRESS V. 1.2 L. McKague R. Baca Completed May 8, 1997) Ald Elspac V. 1.0 (completed R. Brient H. Garcia May 15, 1997) WERE ENTERED in TO QA SOFTAME Folders when signed. First proges of Documents ATTached. B. Sagar Verified by: Summer In Som Date: 5/15/97

CNWRA FORM QAP 9-1

# CENTER FOR NUCEEAR WASTE REGULATORY ANALYSES

### DESIGN VERIFICATION REPORT FOR CNWRA SOFTWARE: 3DStress Version 1.2

May 8, 1997

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#### **3DStress Version 12**

1. Scientific Notebook Documentation Development: CNWRA Scientific Notebook number 113 was verified and was Brent Henderson's Scientific Notebook; it's archived in the CNWRA QA Records Room **as** a QA Record.

2. Programming Language: ANSI C++, using a CC Compiler; IRIX 5.3 Operating System on the "Yosemite" Server.

3. Internal Documentation: On 4/17/97, B. Mabrito reviewed portions of the 3DStress Version 1.2 scientific and engineering software on one of the CNWRA platforms in the GIS **Room** of Building 189. Comment documentation was checked and there is ample, clear, and numerous internal documentation comments meeting the requirements of TOP-018, Section 5.4.4. Considerable structure to the software was added due to the Revision Control System (RCS) which was utilized and each change was captured by the RCS. Mr. Robert Boenau **of** the GLGP Element exercised the 3DStress Version 1.2 software during this verification.

4. Software Labels and Data

a. Header Data and Format: 3DStress Version 1.2 header data and the format were compared against TOP-018 Section 5.4.6 and found generally acceptable. See attached printout sheets from 3DStress Version 1.2. It was brought to the attention **of** R. Boenau that a more comprehensive disclaimer/notice is desired for later versions of this scientific and engineering software.

b. NRC Data: 3DStress Version 1.2 header data and the format were compared against TOP-018, Section 5.4.6, third bullet and found generally acceptable.

c. Source Code Header: The 3DStress Version 1.2 source code header data was compared to TOP-018 Section 5.4.6, **fourth** bullet, and found acceptable.

5. Unique Run Identification: At the top of each output file a unique'identifier was created on the page printout. For instance, a page of the file printed May 8, 1997, **as** a request of the CNWRA Software Custodian, and attached to this report showed the following: "May 8 1997 16:17" in the grey bar across the top of the page. Additionally, in the text box it further stated "#Created by: @(#)3dstress 10-30-96 Rev 1.2 #Date: Thu May 8 16:16:55 1997" which fully meets the unique run identification requirements of TOP-018. See attachments for objective evidence.

## CENTER FOR NULLAR WASTE REGULAR SRY ANALYSES

## **DESIGN VERIFICATION REPORT FOR CNWRA SOFTWARE: EBSPAC V. 1.0**

May 15, 1997

#### **EBSPAC VERSION 1.0**

1. Scientific Notebook Documentation Development: CNWRA Electronic Scientific Notebook number 170 was verified; it is in the QA Records Room and it documents the EBSPAC Version 1.0 software development.

2. Programming Language: ANSI Standard FORTRAN 77 confirmed by the Software Custodian.

3. Internal Documentation: On 1/7/97, B. Mabrito reviewed portions of the EBSPAC Version 1.0 software on one of the CNWRA platforms. EBSPAC fail and other files were reviewed and there were clear and numerous internal documentation comments meeting the requirements of TOP-018 Section 5.4.4. Printouts of screens were made and are part of the EBSPAC Version 1.0 folder documentation.

4. Software Labels and Data

a. Header Data and Format: EBSPAC Version 1.0 header data and the format were compared against TOP-018 (Revision 5 dated 4/3/97) Section 5.4.6 and found acceptable. Printout sheets of the header data and format are in the EBSPAC Version 1.0 scientific and engineering software folder in the QA Records Room.

b. NRC Data: EBSPAC Version 1.0 header NRC data and the format were compared against TOP-018, Section 5.4.6, third bullet and found generally acceptable.

c. Source Code Header: EBSPAC Version 1.0header data was compared to TOP-018 Section 5.4.6, fourth bullet, and found generally acceptable.

5. Unique Run Identification: At the top of output files a unique identifier is created on the print out. For instance, a page of the "Calculation of Waste Package Failure Time" file printed and kept in the EBSPAC Version 1.0 QA Records Folder showed the following: "Version 1.0 Mon Jan 6 17:36:57 1997". This file was created on that date/time and it fully meets the unique run identification requirements, of TOP-018, Section 5.4.5.

6. Software Analysis and Results

a. Analysis: The plusFORT programming tool was utilized **as** the software analysis tool on EBSPAC Version 1.0 during its development. Files of SPAG.fig were used during the development of the code. SPAG is a multi-purpose tool for analyzing and improving FORTRAN programs. It combines restructuring and re-formatting with both static and dynamic analysis in a single package. SPAG has the ability to: (i) restructure FORTRAN 66 to FORTRAN 77, (ii) identify and remove unused variables and code fragments, (iii) insert explicit type declarations for certain typed variables, (iv) convert back and forth between FORTRAN 77 and code with FORTRAN 90 extensions, (v) make re-formatted code clearer by using upper and lower case to distinguish